

Yoswa M Dambisya¹
and N Bridgett Modipa²

¹Senior Professor and
²Final year B. Pharm.
Student;

Department of Pharmacy,
School of Health
Sciences,
University of Limpopo,
Turfloop Campus;
Private Bag X1106,
Sovenga
0727

Correspondence:
Prof. YM Dambisya,
Department of
Pharmacy,
School of Health
Sciences,
University of Limpopo,
Turfloop Campus,
Private Bag X1106,
Sovenga 0727
South Africa
e-mail:
yoswad@ul.ac.za

Risk of exposure to silica dust

at some dust-generating workplaces in the Limpopo Province: a survey and recommendations

ABSTRACT

As part of the National Programme on the Elimination of Silicosis, a blitz inspection was conducted to identify possible exposure to silica at dust-generating workplaces in Limpopo Province. Of the 67 places inspected, only 18 (26.9%) had had hazard identification and risk assessment (HIRA) done, with 10 (14.9%) using an approved inspection authority (AIA). Some employers said they knew nothing about silica and in 27 (40.2%) workplaces the employees had no information about the dangers of dust exposure. Medical surveillance was done in 31 (46.3%) of the workplaces. Some employers complained of lack of cooperation from employees regarding use of personal protective equipment (PPE), while employees tended to accuse the employers of not providing PPEs; and some employees viewed medical examinations as a ploy to get them dismissed from work. Subsequently, two provincial workshops have been held to sensitise both employers and employees on silicosis.

INTRODUCTION

Silicosis is a disabling, nonreversible and often fatal lung disease caused by inhalation of dust containing respirable crystalline silica.^{1,2} The crystalline silica deposits are followed by fibrotic changes and impairment of lung function. In addition to complications of emphysema and massive fibrosis, patients with silica exposure are at higher risk of tuberculosis.² Common sources of crystalline silica include sandstone, granite, slate, coal and pure silica sand.^{3,4}

The International Labour Organisation (ILO) and World Health Organisation (WHO) established a Global Programme for the Elimination of Silicosis (GPES) which aims to reduce the prevalence of silicosis by 2015, and to totally eliminate silicosis in workplaces by 2030.⁵ The premise for the global programme is that it is technically feasible to eliminate silicosis using appropriate technologies and methods of dust control that are not only effective



but also economically affordable. The global programme aims to upgrade or strengthen national capacities and efforts aimed at the elimination of silicosis, and to mobilise broad international cooperation to support the implementation of national programmes.⁵ The South African government developed a National Programme for the Elimination of Silicosis (NPES),^{6,7} spearheaded by the national Department of Labour (DoL) which formed the National Working Group for the Elimination of Silicosis (NWG). The NWG was mandated to implement the NPES using international guidelines from the GPES. The NWG in

Management was advised of the visit by the inspectors at least 48 hours in advance, specifying that the visit would be restricted to possible exposure to silica.

The blitz inspection by the labour inspectors falls within their scope of work, and within their statutory occupational health and safety functions under the Department of Labour. Access to the data and permission to analyse, report and publish were granted by the Limpopo Provincial Department of Labour. As the data collection exercise was a programmatic one, and the data used in this report do not involve identification of

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turn established provincial working groups (PWG), spearheaded by the provincial DoL offices, for the execution of the NPES.⁸

A starting point for silicosis elimination activities was for the PWGs to establish the extent of exposure to silica dust in various workplaces and the prevalence of silicosis within the respective provinces. The Limpopo PWG recommended baseline surveys targeting potentially dust generating concerns (P Mangale, personal communication). We report on one of the surveys carried out in the Limpopo Province to establish exposure to dust and dust control measures employed in some of the workplaces identified as dust-generating.

METHODS

The NWG developed a ‘generic’ checklist which was modified by the Limpopo PWG for ease of use by labour inspectors. The latter were then trained in the use of the checklist, followed by a blitz inspection in April-May 2005. The checklist sought information on the type of industry, number of employees, whether dust had been identified as a health hazard to which employees may be exposed in the workplace, and whether hazard identification and risk assessment (HIRA) was done. Other questions included whether the industry employs the services of an approved inspection authority (AIA) to monitor air quality, and if so how often, and whether or not the employees undergo medical examinations.

The checklist was administered by the labour inspectors with information supplied by the employer and the employee representatives asked for comments. Where possible, information was corroborated with records.

facilities or any individuals, we did not seek ethical approval, as suggested by others.⁹

The data were compiled using a Microsoft Excel database, and tests of association done using the Chi-square test, with $P < 0.05$ as the limit of significance.

RESULTS

During the inspection, sixty-seven (67) workplaces were visited in all parts of the province. As shown in Table 1, the majority of places visited were involved in brickworks and tombstone manufacturing, and a combination of activities (e.g. brickworks, concrete, sandblasting). The number of employees per workplace varied from 1 to 280. Twenty-seven (40.3%) workplaces employed less than 10 people, 21 (31.3%) had 10 to 29 employees, 11 (16.4%) had between 30 and 99, and 2 (3%) employed more than 100. The number of employees was not recorded on 6 (9%) of the completed checklists.

Table 1. Profile of the workplaces inspected

Type of industry	N	%
Brickworks	24	35.8
Tombstone manufacturing	16	23.9
Granite factory	5	7.4
Concrete works	4	6.0
Sandblasting	4	6.0
Charcoal and coal manufacturing	2	3.0
Animal feeds factory	2	3.0
Multipurpose*	10	14.9
Total	67	100.0

* These were typically involved in a number of activities, e.g. brickworks, concrete works, sandblasting.

On whether or not dust had been identified as a health hazard to which employees may be exposed, 37 (55.2%) workplaces answered in the affirmative, 21 (31.3%) said dust was not identified as a hazard, while 9 (13.5%) stated that they were uncertain. The answer to the question on dust as hazard was apparently not related to the type of industry, for instance some brickworks agreed that dust was a hazard, some were uncertain of this, while others said it was not. Only 18 (26.9%) workplaces had had HIRA done, and of these only 10 (14.9%) had the assessment done by an AIA. Those that agreed that dust was a hazard in the workplace were more likely to have had HIRA done than those that were unsure of dust as a hazard or those who said dust was not a hazard in their place ($\chi^2 = 7.681$; 2 df, $P = 0.0.021$; Table 2).

On whether employees were educated about the dangers associated with dust, 40 (59.7%) workplaces had done so, while 27 (40.3%) had not. Those workplaces that had educated their employees on the dangers of dust were more likely to have had HIRA done than those that had not ($\chi^2 = 10.453$; 1 df, $P = 0.001$).

Medical surveillance had been done in 31 (46.3%) places, not done in 26 (38.8%), while whether or not it was done was not stated for 10 (14.9%) workplaces. There was no apparent relationship between those who did HIRA and the likelihood of having had medical surveillance as well ($\chi^2 = 0.958$; 1 df, $P = 0.328$), and none between whether a workplace indicated dust as hazard and likelihood of medical examinations being done ($\chi^2 = 7.587$, 4 df, $P = 0.108$).

Some employers ($n = 10$) said they did not know about silica dust and its health hazards, others ($n = 5$) complained of the high costs of conducting air quality checks. An even larger number ($n = 30$) said engaging AIAs was too expensive for small businesses. In a number of places, the complaint was that employees were not cooperative regarding the wearing of PPEs, and that some of the employees resist medical examinations. Three employers said they would be glad to learn something about silica and promised to establish safety measures to limit exposure.

Employee comments (through their representatives) included observations to the effect that some managers prefer to employ temporary labour, especially illegal immigrants (from Zimbabwe) who do not demand safety equipment. Some said PPEs are only supplied when the labour inspectors are coming to visit. Many were ignorant of silica as a health hazard. In some workplaces the employees reported that the employer expected them to provide their own safety equipment, and in a number of places the workers complained of chest problems (cough and pains) and the lack of medical examination, while at

Table 2. Dust as a health hazard versus HIRA

	HIRA done	HIRA not done	Total
Dust as a hazard			
YES	14	23	37
UNCERTAIN	3	6	9
NO	1	20	21
Total	18	49	67

$\chi^2 = 7.681$; 2 df, $P = 0.0.021$

others the employees felt that medical examinations were one way the employers could use to get rid of them as 'medically unfit for work'. It also emerged that some employees were unhappy with non-compliance by their employers with health and safety regulations but they could not report to the authorities for fear of losing their jobs. However, in a number of places the employee representatives expressed satisfaction with the levels of compliance with the health and safety regulations, regular medical checks, and HIRA.

Observations by the inspectors confirmed the lack of PPEs during the inspection, and the fact that certain measures were carried out only because of the inspection, for instance watering dusty areas and the supply of dust masks on the morning of the visit.

DISCUSSION

The survey showed widespread non-compliance with health and safety regulations for minimizing exposure to silica dust in dust generating workplaces, and that practices advocated for silicosis prevention were poorly observed in most of the workplaces. Whereas the inspected premises were engaged in dust-generating activities, only 55.2% accepted that dust had been identified as a health hazard to which employees are exposed; and even fewer (26.9%) had had HIRA done. Measures such as education for employees on health hazards of dust and medical examinations were not carried out in the majority of workplaces. These observations point to the need for more enforcement of these requirements. The Minister of Labour⁶ has already underlined the need for the employer to assess the workplace to ensure that exposure to silica is kept below the limit of 0.1 mg/m³, and for the employees, through organized labour, to be vigilant in ensuring that these requirements are met.

Whereas the costs of regular medical checks for the employees and the services of AIAs are an issue for some of the employers, these have to be balanced against the expected higher productivity of a healthy workforce. Indeed, Lahiri *et al*¹⁰ have shown that failure to recognize occupational health as an economic phenomenon hinders the effectiveness of intentions to prevent disease

“...practices advocated for silicosis prevention

were poorly observed...”

and injury. The employers will have to be convinced of the economic benefits of a healthy workforce, and reluctant employees should be convinced that the medical examinations are for their own good.¹⁰

The control, and eventual elimination of silicosis, will depend on application of well-known primary and secondary preventive measures. Primary prevention strategies aim to limit silica dust generation through proper ventilation, dust collectors, wetting techniques and use of substitute for quartz containing materials; while secondary measures limit exposure and inhalation of silica through use of PPEs, training of workers and medical surveillance.^{3,5,11} Rosenberg *et al*¹² note that a crucial factor in the successful silicosis programme (in the USA) was the strong public health movement to control TB. Currently South Africa is one of the high burden TB countries,¹³ as well as having a high prevalence of silicosis. Indeed, TB is one of the main threats silicosis presents.² There will be an advantage in twinning silicosis elimination strategies with TB control activities, for which reason the NPES, NWG and PWGs include members from the health department.

It has been observed that ultimately prevalence of silicosis in dust-exposed workers decreases only with improved working conditions and a reduction in dust concentrations of silica, and continuing surveillance to keep the standards of practice up to date.^{11,14,15} The present survey established the state of knowledge about silica in dust-generating workplaces and the preventive measures in place. Based on the survey findings, two provincial workshops have been held (October 2005 in Polokwane and November 2006 in Mokopane) to bridge the gaps identified and sensitise employers, employees and health workers on silicosis and its prevention. The topics covered at these workshops included the requirements of the Occupational Health and Safety (OHS) Act, overview of silicosis, the role of the healthcare worker in silicosis management, the importance of personal protective equipment, and the need for regular medical surveillance (P Mangale, personal communication). Stakeholders from many dust-generating workplaces have thus been reached, what remains is follow-up inspection to evaluate the impact of the workshops.

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